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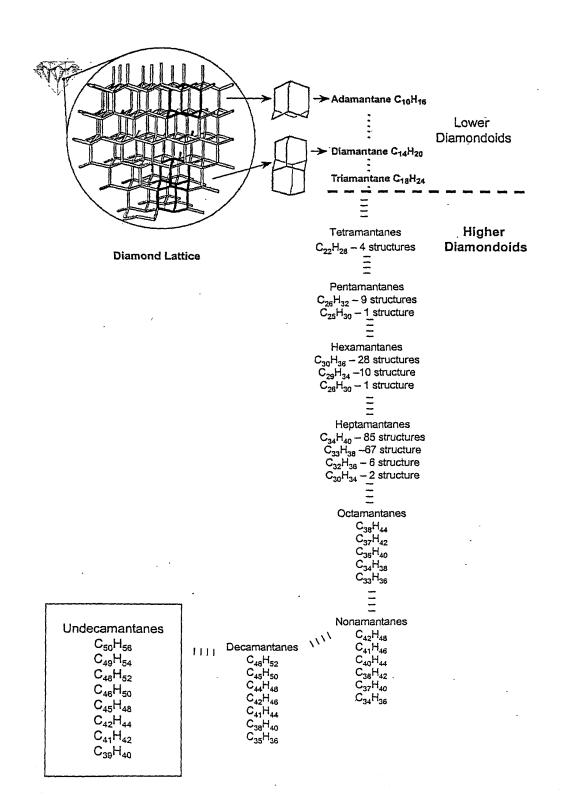
APPLN. FILING DATE: JANUARY 16, 2002

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

'INVENTOR(S): DAHL, ET AL.

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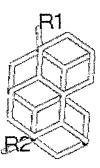
FIG. 1A

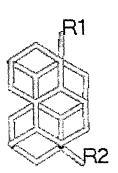


TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES INVENTOR(s): DAHL, ET AL.

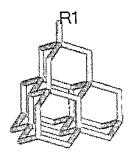
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FIG. 1B

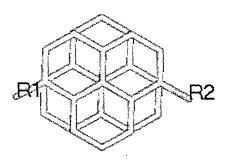




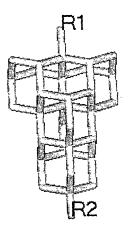
Enantiomeric [123] Tetramantanes



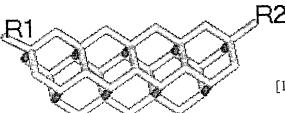
[1(2,3)4] Pentamantane



[12312] Hexamantane (Cyclohexamantane)



[121(3)4] Hexamantane



[121212] Heptamantanes

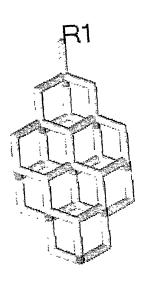
APPLN. FILING DATE: JANUARY 16, 2002

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

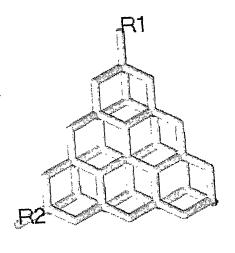
INVENTOR(S): DAHL, ET AL.

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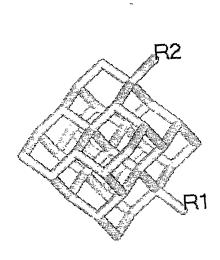
FIG. 1B (continued)



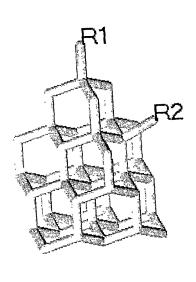
[1213(1)21] Octamantane



[121(2)32(1)3] Nonamantane



[1231241(2)3] Decamantane



[123(1,2)42143] Undecamantane

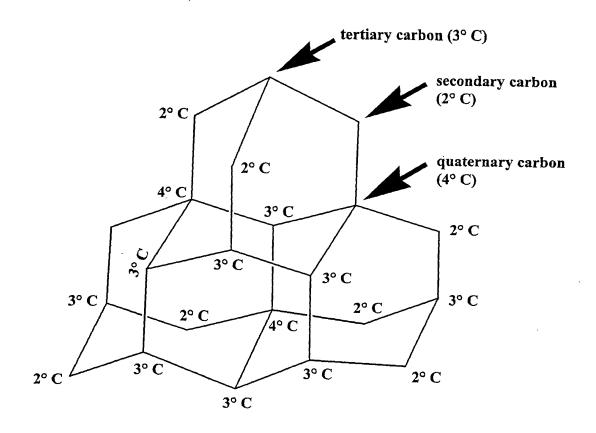
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FIG. 2A

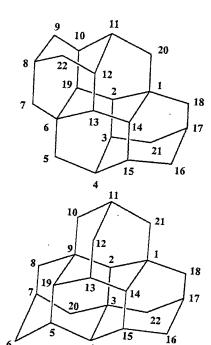


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FIG. 2B



[121] Tetramantane (anti-)

4 non-equivalent tertiary carbons:

4, 11 (equivalent)

8, 17 (equivalent)

3, 10, 12, 15 (equivalent)

2, 13, 14, 19 (equivalent)

[1[2]3] Tetramantane (iso-)

4 non-equivalent tertiary carbons:

2

4, 14, 19 (equivalent)

5, 13, 15 (equivalent)

7, 11, 17 (equivalent)

[123]A Tetramantane (skew-A) 6 non-equivalent tertiary carbons:

6, 7 (equivalent)

4, 9 (equivalent)

3, 14 (equivalent)

2, 15 (equivalent)

10, 17 (equivalent) 12, 19 (equivalent)

[123]B Tetramantane (skew-B) 6 non-equivalent tertiary carbons:

6, 17 (equivalent)

4, 15 (equivalent)

11, 12 (equivalent)

3, 19 (equivalent)

9, 14 (equivalent)

8, 20 (equivalent)

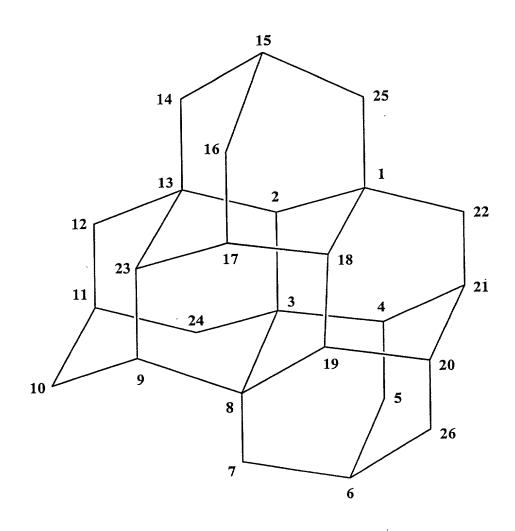
TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 2C

Pentamantane



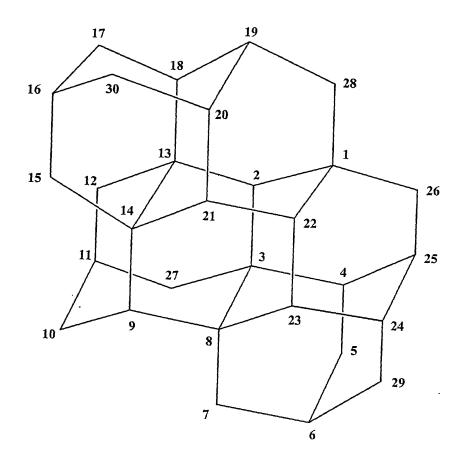
TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 2D

Hexamantane



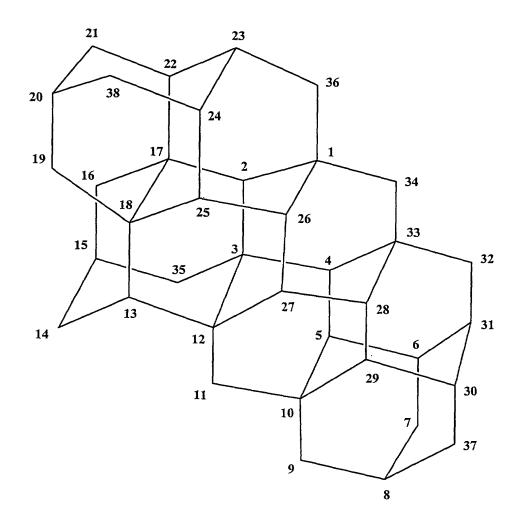
TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

Inventor(s): Dahl, et al.

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FIG. 2E

Octamantane



. 1011; (1)100 (1415 t. 40 mg. 100

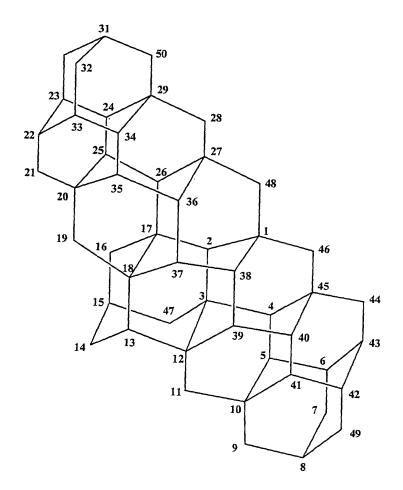
APPLN. FILING DATE: JANUARY 16, 2002

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FIG. 2F

Undecamantane

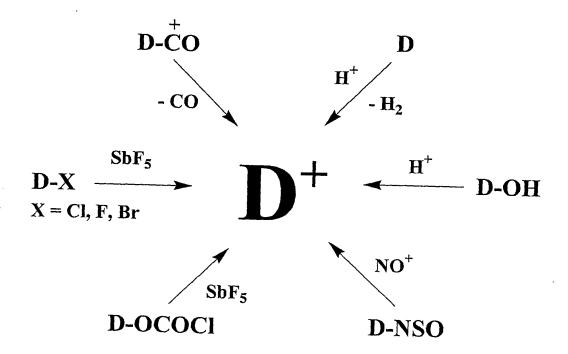


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FIG. 3A

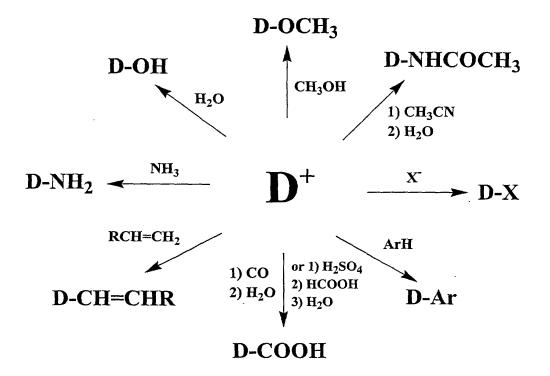


TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 3B



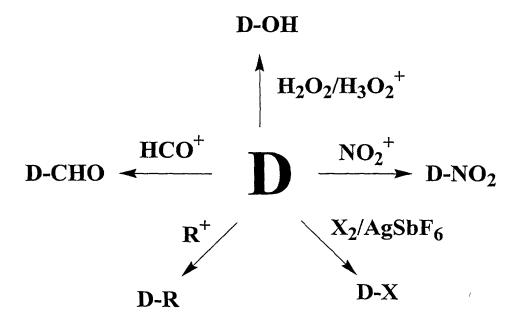
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TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 3C



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FIG. 4A

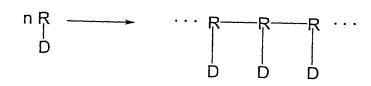


FIG. 4B

FIG. 4C

FIG. 4D

$$R^1$$
 R^2
 n D R^1 D R^2 R^1 D R^2 R^2

FIG. 4E

$$R^{1} R^{2} + m CP \rightarrow R^{1} - D - R^{2} - CP - R^{1} - D - R^{2} - CP \cdot R^{1}$$

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 4F

FIG. 4G

FIG. 4H

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INVENTOR(S): DAHL, ET AL.

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FIG. 4I

Polyvinyl

Further vinyl addition polymers

D-CH=
$$C(CH_3)_2$$

acrylates

$$CH_2 = C - C - O - D_2$$
 monomer

$$H_2C$$
 C repeat unit C OD_2

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FIG. 4I (cont.)

Further addition polymers

Polyacetaldehyde

D-CH=O

monomer

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FIG. 4I (cont.)

Condensation polymers

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FIG. 4I (cont.)

Condensation polymers (cont.)

Epoxy resins (based on epichlorohydrin - bisphenol A resins)

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FIG. 4I (cont.)

Diamondoid-containing graft polymer

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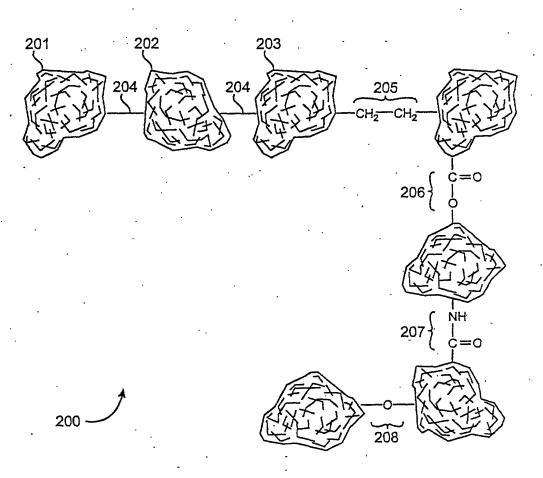


FIG. 5A

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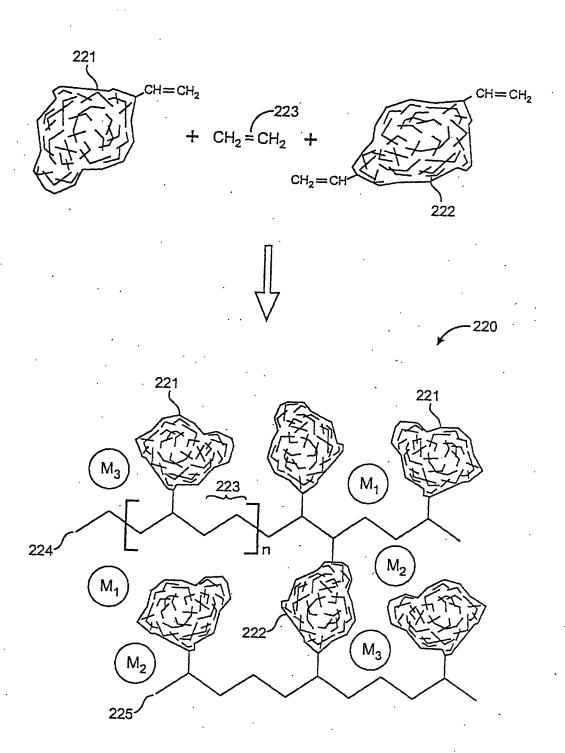


FIG. 5B

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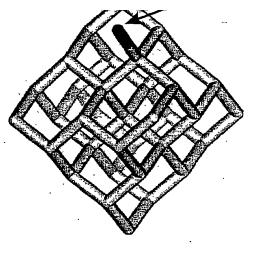


FIG. 5D

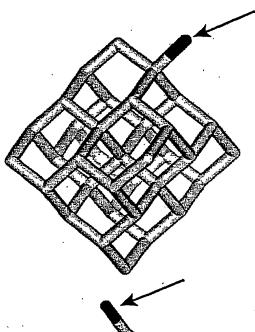


FIG. 5E

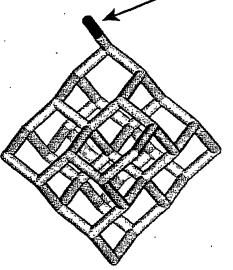
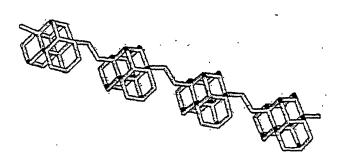
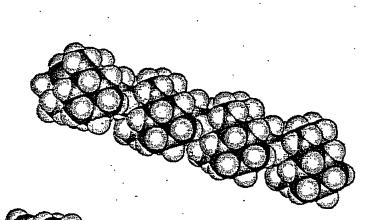


FIG. 5F

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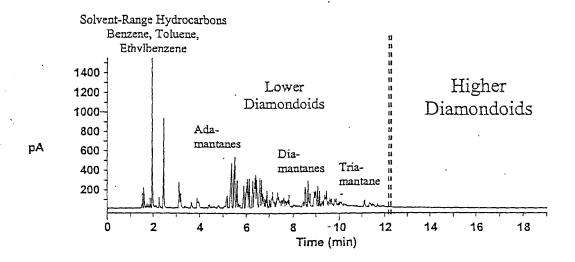


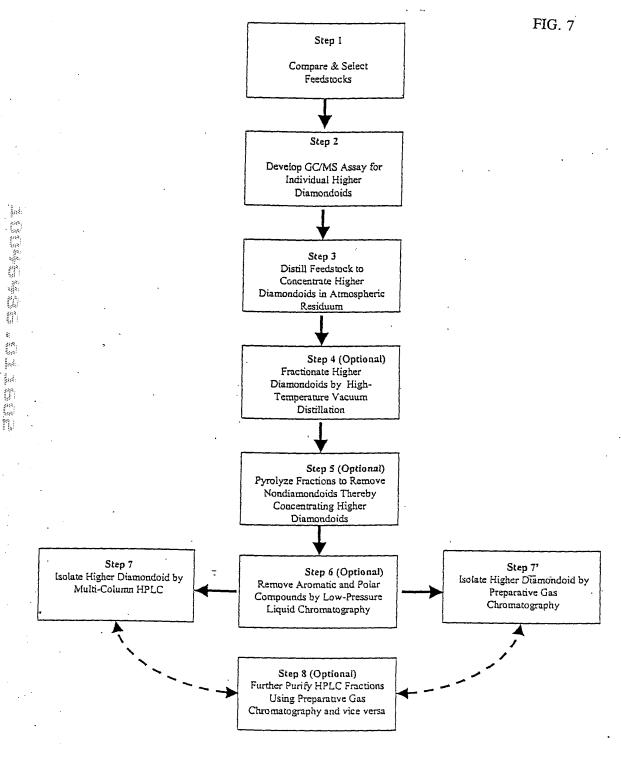
TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 6





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FIG. 8A

| | | | | · |
|-------------------|---------------------------------|--------------------------------|----------------------------------|---|
| Higher Diamondoid | Compound Reference Number | M+ (m/z) (Equals Base Peak) | GC/MS Retention Times* (min.) | GC/MS Relative Retention Times** (min.) |
| | | | | |
| Tetramantane #1 | 4-1 | 292 | 8.10 | 1.00 |
| Tetramantane #2 | 4-2 | 292 | 8.66 | 1.07 |
| Tetramantane #3 | 4-3 | 292 | 9.12 | 1.13 |
| Pentamantane #1 | 5-1 | 344 | 10.40 | 1.28 |
| Pentamantane #2 | 5-2 | 344 | 11.93 | 1.47 |
| Pentamantane #3 | 5-3 | 344 | 11.98 | 1.48 |
| Pentamantane #4 | 5-4 | 344 | 12.38 | 1.53 |
| Pentamantane #5 | 5-5 | 344 | 12.50 | 1.54 |
| Pentamantane #6 | 5-6 | 344 | 12.71 | 1.57 |
| Cyclohexamantane | C-6 | 342 | 12.34 | 1.52 |
| Hexamantane #1 | 6-1 | 396 | 14.46 | 1.78 |
| Hexamantane #2 | 6-2 | 396 | 14.61 | 1.80 |
| Hexamantane #3 | 6-3 | 396 | 14.97 | 1.85 |
| Hexamantane #4 | 6-4 | 396 | 14.99 | 1.85 |
| Hexamantane #5 | 6-5 | 396 | 15.04 | 1.86 |
| Hexamantane #6 | 6-6 | 396 | 15.13 | 1.87 |
| Hexamantane #7 | 6-7 | 396 | 15.22 | 1.88 |
| Hexamantane #8 | 6-8 | 396 | 15.32 | 1.89 |
| Hexamantane #9 | 6-9 | 396 | 15.42 | 1.90 |
| Hexamantane #10 | 6-10 | 396 | 15.45 | 1.91 |
| Hexamantane #11 | 6-11 | 396 | 15.49 | 1.91 |
| Hexamantane #12 | 6-12 | 396 | 15.54 | 1.92 |
| Hexamantane #13 | 6-13 | 396 | 15.60 | 1.93 |
| Hexamantane #14 | 6-14 | 396 | 15.81 | 1.95 |
| Hexamantane #15 | 6-15 | 396 | 15.89 | 1.96 |
| Hexamantane #16 | 6-16 | 396 | 16.05 | 1.98 |
| Hexamantane #17 | 6-17 | 396 | 16.08 | 1.99 |
| Heptamantane #1 | 7-1 | 394 | 14.96 | 1.85 |
| Heptamantane #2 | 7-2 | 394 | 15.53 | 1.92 |
| Heptamantane #3 | 7-3 | 448 | 17.34 | 2.14 |
| Heptamantane #4A | 7-4A | 448 | 17.70 | 2.18 |
| Heptamantane #4B | 7-4B | 448 | 17.70 | 2.18 |
| Heptamantane #5 | 7-5 | 448 | 17.71 | _ 2.19 |
| Heptamantane #6 | 7-6 | 448 | 17.79 | 2.20 |
| Heptamantane #7 | 7-7 | 448 | 17.82 | 2.20 |
| Heptamantane #8 | 7-8 | 448 | 17.99 | 2.22 |
| Heptamantane #9A | 7-9A | 448 | 18.13 | 2.24 |
| Heptamantane #9B | 7-9A | 448 | 18.13 | 2.24 |
| Heptamantane #9C | 7-9C | 448 | 18.13 | 2.24 |
| Heptamantane #10 | 7-10 | 448 | 18.15 | 2.24 |
| Heptamantane #11 | 7-10 | 448 | 18.20 | 2.25 |
| | | 448 | 18.21 | 2.25 |
| Heptamantane #12 | 7-12 | 448 | 18.29 | 2.26 |
| Heptamantane #13A | 7-13A | 448 | 18.29 | 2.26 |
| Heptamantane #13B | 7-13B | | | 2.26 |
| Heptamantane #13C | 7-13C | 448 | 18.29 18.32 | 2.26 |
| Heptamantane #14 | 7-14 | 448 | 10.32 | |

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FIG. 8A cont'd

| Higher Diamondoid | Compound Reference Number | M+ (m/z) (Equals Base Peak) | GC/MS Retention Times* (min.) | GC/MS Relative Retention Times** (min.) |
|-------------------|---------------------------------|--------------------------------|----------------------------------|---|
| Octamantane #1 | 8-1 | 446 | 17.30 | 2.14 |
| Octamantane #2 | 8-2 | 446 | 17.37 | 2.14 |
| Octamantane #3 | 8-3 | 446 | 17.42 | 2.15 |
| Octamantane #4 | 8-4 | 446 | 17.47 | 2.16 |
| Octamantane #5 | 8-5 | 446 | 17.71 | 2.19 |
| Octamantane #6 | 8-6 | 446 | 17.82 | 2.20 |
| Octamantane #7 | 8-7 | 446 | 17.86 | 2.20 |
| Octamantane #8 | 8-8 | 446 | 18.22 | 2.25 |
| Octamantane #9 | 8-9 | 446 | 18.46 | 2.28 |
| Octamantane #10 | 8-10 | 446 | 18.65 | 2:30 |
| Octamantane #11 | 8-11 | 446 | 18.76 | 2.32 |
| Nonamantane #1 | 9-1 | 498 | 19.86 | 2.45 |
| Decamantane #1 | 10-1 | 456 | 18.57 | 2.29 |
| Decamantane #2 | 10-2 | 496 | 21.33 | 2.63 |
| Undecamantane#1 | 11-1 | 508 | 21.05 | 2.60 |

^{*} HP-MS5 (30m X 0.25 mm, 0.25 micron film), helium carrier gas,

^{**} Reference to Tetramantane #1

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FIG. 8B

| Compound Reference Number 4-1 | Fraction Number | Elution Time | Elution Volume | Elution Volume |
|--|---|---|--|---|
| Reference Number 4-1 | | | i | |
| Number 4-1 | | | | Relative to |
| 4-1 | | (min.) | (mL) | 4-1 |
| | 4 | 119 | 594 | 1.00 |
| 4-2 | 7 | 125 | 627 | 1.05 |
| | | | | 1.04 |
| | | | | 1.13 |
| | | | | 1.27 |
| | | | | 1.43 |
| | | | | 1.32 |
| | | | | 1.27 |
| | | | | 1.29 |
| | | 159 | 797 | 1.34 |
| | | 181 | 903 | 1.52 |
| | | 172 | 861 | 1.45 |
| | | | 1012 | 1.70 |
| | | | 903 | 1.52 |
| | | 185 | 924 | 1.56 |
| | | 242 | | 2.04 |
| | | | 945 | 1.59 |
| | | | 967 | 1.63 |
| | | | 967 | 1.63 |
| | | | 1071 | 1.80 |
| | | | 935 | 1.57 |
| | 44 | 205 | 1024 | 1.72 |
| | 36 | 187 | 935 | 1.57 |
| | | 193 | 967 | 1.63 |
| | 45 | 207 | 1036 | 1.74 |
| | 44 | 205 | 1024 | 1.72 |
| 6-17 | 49 | 217 | 1083 | 1.82 |
| 7-1 | 45 | 207 | 1036 | 1.74 |
| 7-2 | 41 | 198 | 989 | 1.66 |
| 7-3 | 61 | 238 | 1190 | 2.00 |
| _ 7 -4 A | 90 | 304 | 1519 | 2,56 |
| 7-4B | 90 | 304 | 1519 | 2.56 |
| 7-5 | 76 | 270 | 1349 | 2.27 |
| 7-6 | 67 | 251 | 1253 | 2.11 |
| 7-7 | | | - | |
| 7-8 | 59 | 234 | 1172 | 1.97 |
| | 60 | 236 | 1181 | 1.99 |
| 7-9B | 62 | 240 | 1200 | 2.02 |
| 7-9C | 78 | 274 | 1370 | 2.31 |
| 7-10 | 86 | 291 | 1455 | 2.45 |
| 7-11 | _ | | | |
| | | | | I — |
| | 58 | 233 | 1163 | 1.96 |
| | | | | 2.24 |
| | | | | 2.56 |
| | | | | 2.16 |
| | 4-3 5-1 5-2 5-3 5-4 5-5 5-6 C-6 6-1 6-2 6-3 6-4 6-5 6-6 6-7 6-8 6-9 6-10 6-11 6-12 6-13 6-14 6-15 6-16 6-17 7-1 7-2 7-3 7-4A 7-4B 7-5 7-6 7-7 7-8 7-9A 7-9B 7-9C 7-10 | 4-3 6 5-1 11 5-2 19 5-3 28 5-4 22 5-5 19 5-6 20 C-6 23 6-1 33 6-2 29 6-3 43 6-4 33 6-5 35 6-6 63 6-7 37 6-8 39 6-9 39 6-10 48 6-11 36 6-12 44 6-13 36 6-14 39 6-15 45 6-16 44 6-17 49 7-1 45 7-2 41 7-3 61 7-4A 90 7-4B 90 7-5 76 7-6 67 7-7 7 7-9B 62 7-9C 78 7-13A 58 <t< td=""><td>4-3 6 123 5-1 11 134 5-2 19 151 5-3 28 170 5-4 22 157 5-5 19 151 5-6 20 153 C-6 23 159 6-1 33 181 6-2 29 172 6-3 43 202 6-4 33 181 6-2 29 172 6-3 43 202 6-4 33 181 6-5 35 185 6-6 63 242 6-7 37 189 6-8 39 193 6-9 39 193 6-10 48 214 6-11 36 187 6-12 44 205 6-13 36 187 6-14 39 193</td><td>4-3 6 123 616 5-1 11 134 669 5-2 19 151 754 5-3 28 170 850 5-4 22 157 786 5-5 19 151 754 5-6 20 153 765 5-6 20 153 765 6-1 33 181 903 6-2 29 172 861 6-3 43 202 1012 6-4 33 181 903 6-5 35 185 924 6-6 63 242 1211 6-7 37 189 945 6-8 39 193 967 6-9 39 193 967 6-10 48 214 1071 6-11 36 187 935 6-12 44 205 1024 </td></t<> | 4-3 6 123 5-1 11 134 5-2 19 151 5-3 28 170 5-4 22 157 5-5 19 151 5-6 20 153 C-6 23 159 6-1 33 181 6-2 29 172 6-3 43 202 6-4 33 181 6-2 29 172 6-3 43 202 6-4 33 181 6-5 35 185 6-6 63 242 6-7 37 189 6-8 39 193 6-9 39 193 6-10 48 214 6-11 36 187 6-12 44 205 6-13 36 187 6-14 39 193 | 4-3 6 123 616 5-1 11 134 669 5-2 19 151 754 5-3 28 170 850 5-4 22 157 786 5-5 19 151 754 5-6 20 153 765 5-6 20 153 765 6-1 33 181 903 6-2 29 172 861 6-3 43 202 1012 6-4 33 181 903 6-5 35 185 924 6-6 63 242 1211 6-7 37 189 945 6-8 39 193 967 6-9 39 193 967 6-10 48 214 1071 6-11 36 187 935 6-12 44 205 1024 |

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FIG. 8B cont'd

| Higher Diamondoid | Compound Reference Number | Fraction Number | Elution Time (min.) | Elution Volume (mL) | Elution Volume Relative to 4-1 |
|-------------------|---------------------------------|--------------------|---------------------------|---------------------------|---|
| Octamantane #1 | 8-1 | 81 | 280 | 1402 | 2.36 |
| Octamantane #2 | 8-2 | 83 | 285 | 1423 | 2.40 |
| Octamantane #3 | 8-3 | 64 | 244 | 1221 | 2.06 |
| Octamantane #4 | 8-4 | | | | |
| Octamantane #5 | 8-5 | 63 | 242 | 1211 | 2.04 |
| Octamantane #6 | 8-6 | 79 | 276 | 1381 | 2.32 |
| Octamantane #7 | 8-7 | 71 | 259 | 1296 | 2.18 |
| Octamantane #8 | 8-8 | 84 | 287 | 1434 | 2.41 |
| Octamantane #9 | 8-9 | 74 | 266 | 1328 | 2.24 |
| Octamantane #10 | 8-10 | 80 | 280 | 1402 | 2.36 |
| Octamantane #11 | 8-11 | 85 | 289 | 1445 | 2.43 |
| Nonamantane #1 | 9-1 | 89 | 297 | 1487 | 2.50 |
| Decamantane #1 | 10-1 | 83 | 285 | 1423 | 2.40 |
| Decamantane #2 | 10-2 | | | | |
| Undecamantane#1 | 11-1 | 101 | 355 | 1774 | 2.99 |

ODS HPLC Whatman ODS-II 10/50

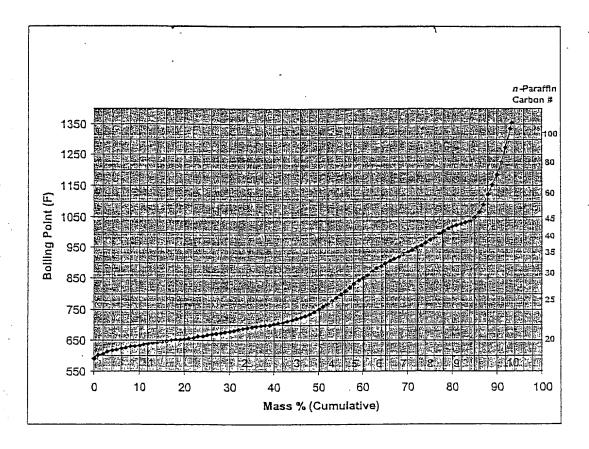
(2 Columns in series), acetone mobile phase @5.0 mL/min.

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FIG. 9



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Distillation Cuts Made on Atmospheric Resid of Feedstock B (°C) 950- 976 976-Fr. 8 Fr.7 Fr.4

Higher Diamondoid

Cyclohexamantanes

Heptamantanes

Nonamantanès Decamantanes

Octamantanes

Hexamantanes

Pentamantanes

Tetramantanes

Undecamantanus

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INVENTOR(S): DAHL, ET AL.

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FIG. 11A

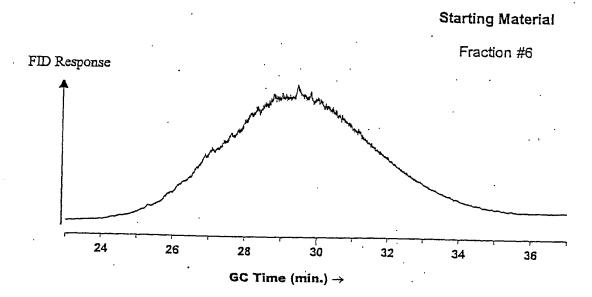
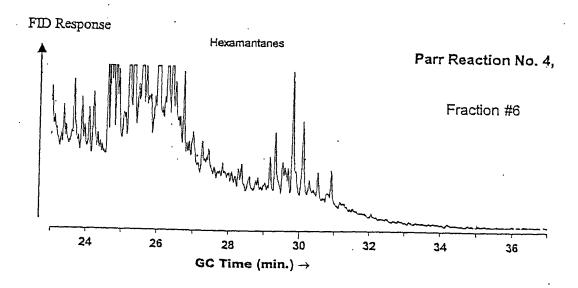


FIG. 11B



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INVENTOR(S): DAHL, ET AL.
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FIG. 12A

| CUS Fully Fully Condensed Hex 2 Fully Fully Condensed Fully Conden |
|--|
| Fraction # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 Hexamentane 23 24 25 26 27 28 29 20 10 11 12 13 14 15 16 17 Hexamentane Hex 2 |
| # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 Hexamatare 23 24 25 26 27 28 29 20 20 4 5 6 7 8 9 10 11 12 13 14 15 16 17 Hexamatare Hex 2 |
| 23 24 25 25 26 27 28 29 20 20 21 21 22 29 20 20 21 21 22 21 21 |
| 24 |
| 25 |
| 26 27 28 29 3x Hex 2 |
| 27 28 29 4x 1 1 1 1 1 1 1 1 1 |
| 28 |
| 29 Hex 2 |
| |
| 30 (32) |
| |
| 31 |
| 32 鐵總 |
| 33 x Hex 1 Hex 4 |
| 34 |
| 35 Hex 5 |
| 36 Hex 11 Hex 13 |
| 37 Hex 7 |
| 38 Hex 8 Hex 9 Hex 1 |
| |
| 40 |
| 41 41 41 |
| 42 Hex 3 |
| 45 |
| 44 Hex 12 Hexa 16 Hex 15 |
| |
| |
| 47 48 Hex 10 |
| 48 Hex 17 |
| 50 |
| 51 |
| |
| 61 |
| 62 |
| 63 Hex 6 |
| 64 |
| 65 |

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FIG. 12B

| • | | | | | | | | | | | | | | | | | | | |
|---------------|----------|------------------|--|--|--|--------------------|--------------|----------|-------------|----------------|---------------|--|---------------|--|--|--|--|--|------------|
| Hypercarb | | | \neg | | | | | | | | | | | | | | | Fully | |
| HPLC Fraction | | | | | | | ı | | - 1 | | | | | | | | | Condensed | |
| # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | _17_ | Hexamantane | |
| l 1 | · | | | | | | | | | | | | | | | | | | |
| 2 | | | _ | | - | | \neg | | | | | | | | | | | | |
| 3 | | | | <u> </u> | | | | | | | | | | | | | | | |
| 4 | | | | | | | | \neg | | | | | | | | | | | |
| 5 | | | | \vdash | _ | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | Π | Γ | | | | | | | |
| 27 | _ | | | | | | | | | | | | | | | | | | Hex 13 |
| | | | | - | - | - | - | | | | - | | | | | | | | |
| 28 | | | | | | | _ | | | | - | | Approx 1889 | X | | - | | | Hex 14 |
| 29 | | | | ļ | <u> </u> | _ | | | | | ⊢ | | | NAME OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER OWNE | | - | | | Hex 1 |
| | X | | | <u> </u> | ├ | - | | | <u> </u> | | | ├ | ├ | STATE OF THE PARTY | | | | | Hex 10 |
| 31 | | | | | | - | | | | 1. | T. Pridate Po | | | 調 | | | | | Hex 11 |
| 32 | | | | <u> </u> | ļ | <u> </u> | <u> </u> | | <u> </u> | | | | ├ | Bitalial h | | | - | | |
| 33 | | $oxed{oxed}$ | | | <u> </u> | <u> </u> | ļ | <u> </u> | ├ | | ∵XC | | ┼ | ├ | | | | | 1 |
| 34 | | | | <u>L</u> . | | <u> </u> | <u> </u> | _ | <u> </u> | | | | | ┼— | | | | | i |
| 35 | <u> </u> | | | <u> </u> | 1_ | <u> </u> | | | <u> </u> | <u> </u> | 1 | | | - | | | | | 1 |
| 43 | = | | | | 1 | $\overline{}$ | ╒ | - | | | | | $\overline{}$ | 1 | | | | | 1 |
| 43 | | | | ┼ | ╁ | × | _ | \vdash | - | - | ╌ | ┼ | +- | 1 | | | | | Hex 6 |
| | | | | - | ┼ | Paris Co. | - | - | + | ╁ | +- | +- | 1 | 1 | | | | | 1 |
| 45 | | | | +- | +- | ┼ | - | - | ┼ | ├ | ╁╌ | + | + | | — | | | | 1 |
| | | | | + | ╀┈ | +- | - | - | ╂╌╴ | \vdash | + | +- | | +- | | | | | 1 |
| 47 | | | | ┼ | ┼ | + | ┼ | ⊢ | ╫ | ┼ | +- | + | +- | + | | | | | 1 |
| 48 | | ļ | ├ | \vdash | +- | +- | ┼ | ┼- | **** | - | ╫ | + | + | +- | | a X | | | Hex 15 |
| 49 | | | - | ┼ | +- | | ┼ | ╁ | i X | | +- | + | + | + | | | | | Hex 9 |
| 50 | +- | - | ╄ | ┼ | + | ╁ | ┼ | ┼ | | - | +- | + | + | + | + | 1-6,0,000 | | | 1 |
| 51 | | | <u> </u> | $oldsymbol{\perp}$ | 1_ | ╄ | | ļ | | | ↓ | ┼ | | ┿ | - | - | - | | 1 |
| 52 | 2 | | | _ | 1 | | <u> </u> | | | <u>}</u> | | | | ╀ | <u> </u> | | <u> </u> | | 4 |
| 53 | 3 | | | | | T | | | | <u> </u> | | 1 | | | | | | | 4 |
| 54 | | × | | T | T | | П | T | Ţ | | | 1 | | | | 1 | <u> </u> | | Hex 2 |
| 55 | | | | +- | + | + | 1 | \top | 1 | \top | | 1 | | | | | | | |
| 56 | | A lar collection | 1 | ┼ | + | +- | + | 十 | +- | +- | +- | 1 | | | | | | | |
| | _ | | | +- | +- | +- | + | 十 | + | +- | 1 | 1 | 1 | 1 | | | | | |
| 57 | _ | THE WAY | - | +- | +- | +- | +- | + | + | +- | + | + | 1 | \top | 1 | 1 | | | 7 |
| 58 | | | 1_ | | 4 | 4- | _ | + | _ | +- | - | + | +- | + | +- | +- | \vdash | 1 | 7 |
| 59 | | 語傳統 | ř. | | | $oldsymbol{\perp}$ | | | | _ | 4 | _ | +- | +- | + | + | | | ┪ |
| 60 | | | | | | | \perp | | | _ | | | | - | | + | +- | | -{ |
| 6 | | 经系统 | ģ | | | | | | | | | _ | | | ┼ | +- | - | | - |
| 6: | | T | Т | | T | Τ | I | \prod | | | | 1 | | 1_ | | | <u> </u> | | - |
| 7: | | T - | T | | | T | | Ą. | T | T | | | | | | | <u> </u> | | 4 |
| 7: | | | T | 1 | + | T | 0.00 | | 1 | T | 1 | | | | | | 1 | | 4 |
| 7. | | 1 | 1 | \top | 1 | \top | × | | \top | \top | \top | | | | | | 1 | | ⊣ _ |
| - 7 | | | † | \top | + | \top | | क्रा | T | \top | \perp | $oxed{\mathbb{T}}$ | | | | | | | Hex 7 |
| 7 | | + | T | \top | \top | 1 | ing. | 꺌 | 1 | | | | | | | | <u> </u> | | 4 |
| 7 | | 1 | \top | \dashv | \top | \top | | | 1 | \top | \top | | | | | | | | _ |
| 7 | | | 1 | | 1 | _ | 1 | 7 | \top | T | 1 | | | | | | | | 4 |
| 8 | | | ╪ | + | + | 十 | ╈ | + | ╅ | \top | _ | T | T | 1 | 1 | 1 | | | |
| 6 | 71 | | ــــــــــــــــــــــــــــــــــــــ | L | | | | | | | | | | | | | | | |

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

INVENTOR(S): DAHL, ET AL.

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FIG. 13A

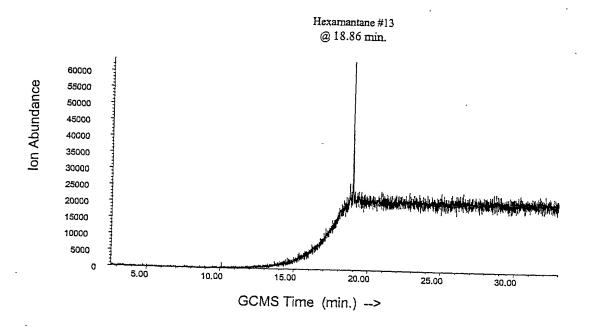
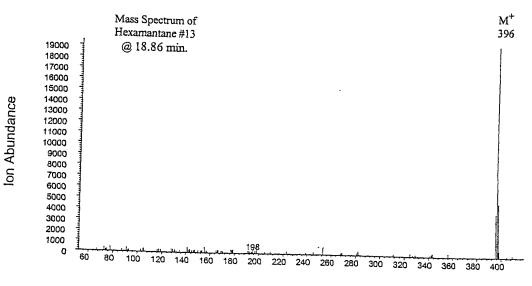


FIG. 13B



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TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

INVENTOR(S): DAHL, ET AL.

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FIG. 14A

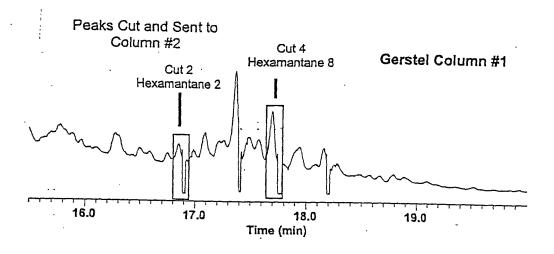
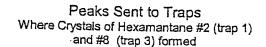
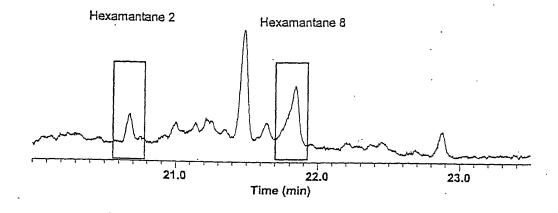


FIG. 14B



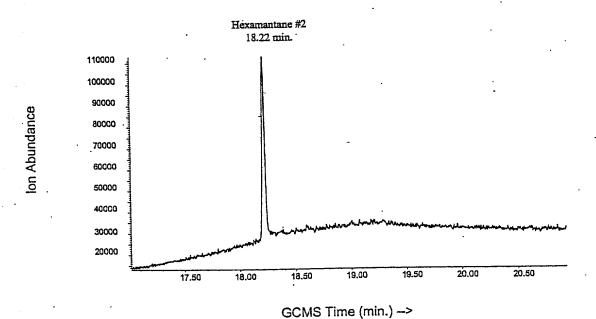
Gerstel Column #2



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INVENTOR(S): DAHL, ET AL.
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FIG. 15A



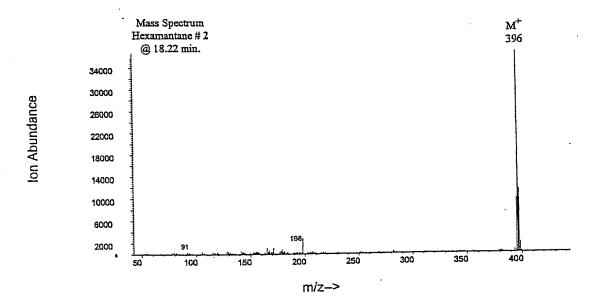


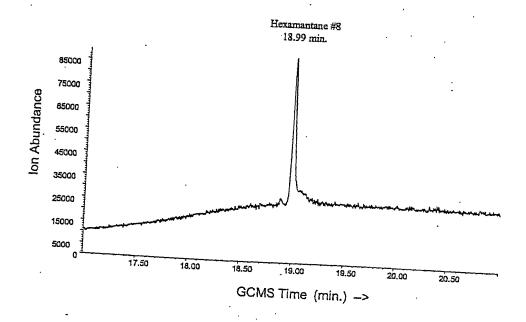
FIG. 15B

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INVENTOR(S): DAHL, ET AL.

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FIG. 15C



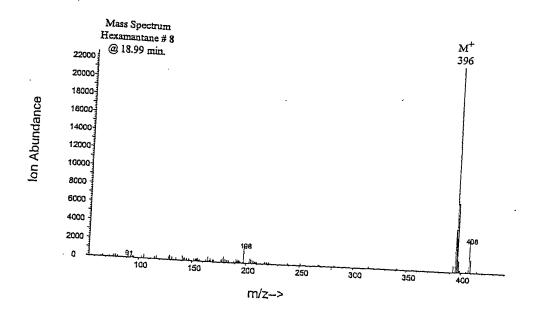


FIG. 15D.

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t(u-u)

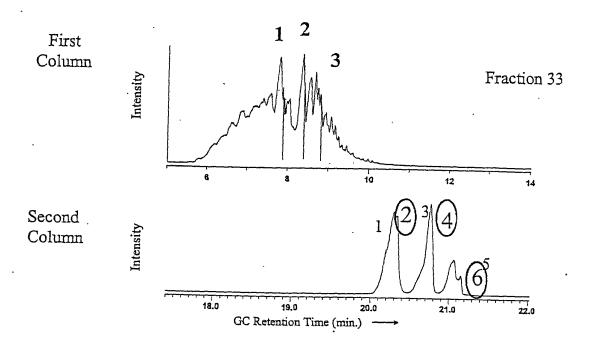
. 31111_011ED 11513_4_1685 sung

APPLN. FILING DATE: JANUARY 16, 2002 TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 16



TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

INVENTOR(S): DAHL, ET AL.

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FIG. 17

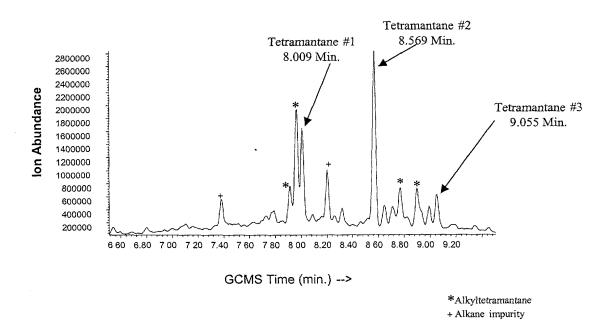
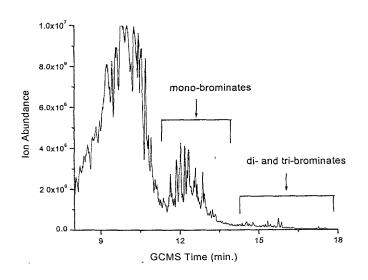


FIG. 18

TIC of Bromination Products of a Feedstock Containing a Mixture of Tetramantanes and Alkyltetramantanes



Contribute a sufficient

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

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FIG. 19

TIC of Mono-brominated Products

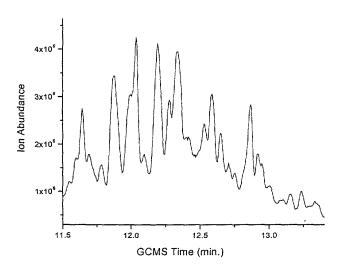
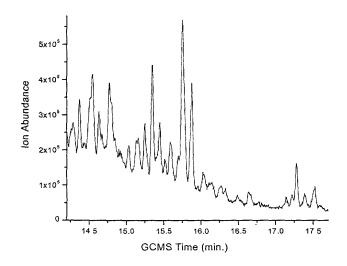


FIG. 20

TIC of Di- and Tri-brominated Products



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INVENTOR(S): DAHL, ET AL.

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FIG. 21

GC of a Mono-brominated Tetramantane (*, 12.038 min.)

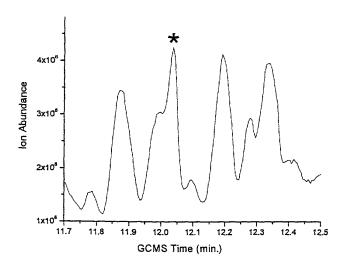
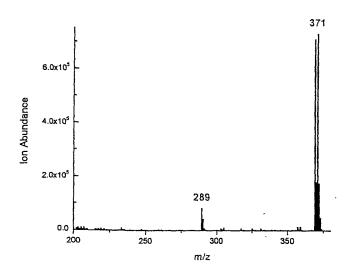


FIG. 22

GCMS of the Mono-brominated Tetramantane @ 12.038 min.



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FIG. 23

GC of Mono-brominated Methyltetramantanes (*, 11.644 and 11.992 min.)

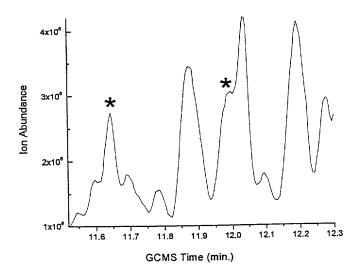
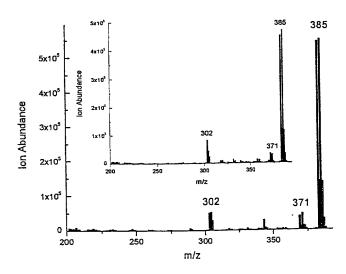


FIG. 24

GCMS of the Monobrominated Methyltetramantanes @ 11.644 (inset) and 11.992 min.



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FIG. 25

GC of a Mono-brominated Dimethyltetramantane (*, 12.192 min.)

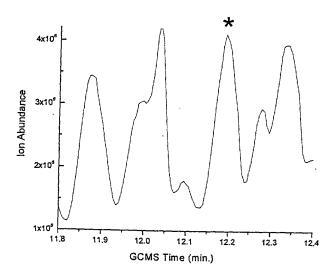
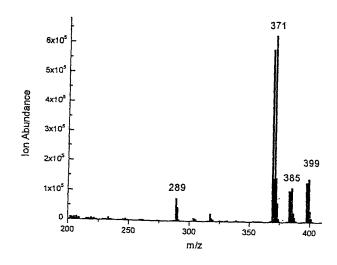


FIG. 26

GCMS of the Monobrominated Dimethyltetramantane @ 12.192 min.



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INVENTOR(S): DAHL, ET AL.

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FIG. 27

GC of a Di-brominated Tetramantane (*, 15.753 min.)

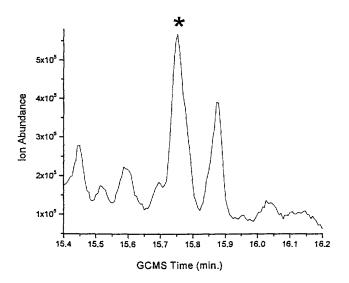
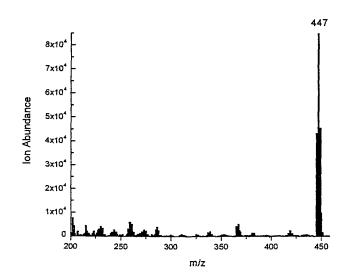


FIG. 28

GCMS of the Di-brominated Tetramantane @ 15.753 min.



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INVENTOR(S): DAHL, ET AL.

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FIG. 29

GC of a Di-brominated Methyltetramantane (*, 15.879 min.)

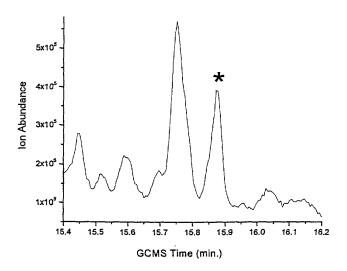
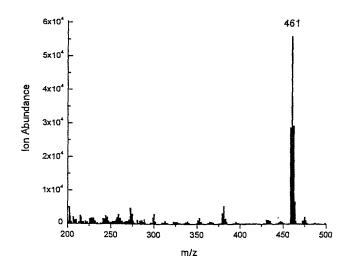


FIG. 30

GCMS of the Di-brominated Methyltetramantane @ 15.879 min.



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INVENTOR(S): DAHL, ET AL.

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FIG. 31

GC of a Tri-brominated Tetramantane (*, 17.279 min.)

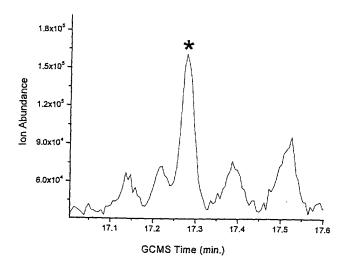
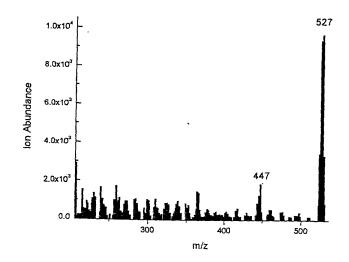


FIG. 32

GCMS of the Tri-brominated Tetramantane @ 17.279 min.



TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

INVENTOR(S): DAHL, ET AL.

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FIG. 33

GC of a Tri-brominated Methyltetramantane (*, 15.250 min.)

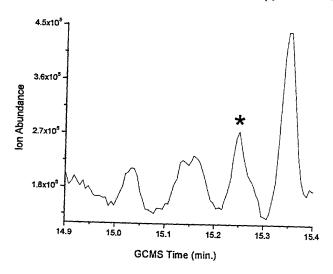
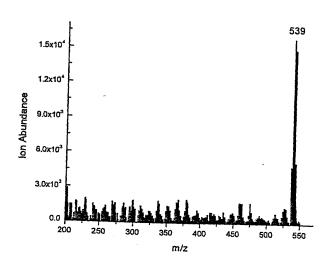


FIG. 34

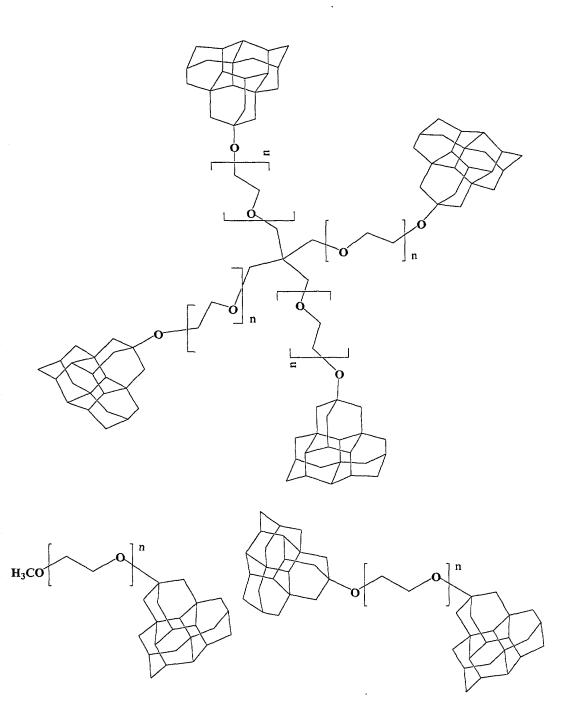
GCMS of the Tri-brominated Methyltetramantane @ 15.250 min.



compare as agreement that the

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FIG. 35



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FIG. 36

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FIG. 37A

Aromatic bisphenols: HO-Ar-OH

Ar:

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FIG. 37B

TITLE: POLYMERIZABLE HIGHER DIAMONDOID DERIVATIVES

INVENTOR(S): DAHL, ET AL.

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FIG. 38

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INVENTOR(S): DAHL, ET AL.

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FIG. 39A

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FIG. 39B

Aromatic Dianhydride

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INVENTOR(S): DAHL, ET AL.

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FIG. 40

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FIG. 41

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FIG. 42

Aromatic diamines: H₂N-Ar-NH₂

Ar: